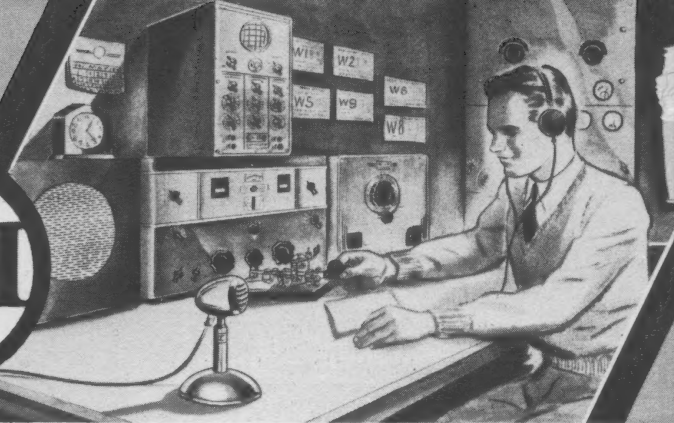


HAM TIPS

from



Published by RCA Manufacturing Company, Inc., Camden, N. J., U. S. A.

VOL. 4 — No. 3

CAMDEN, N. J.

JUNE-JULY, 1941

NEW LOW-COST TUBES FILL VITAL NEEDS IN COMMUNICATION

NEW RCA GUIDE ON XMTG TUBE NATIONALLY ACCLAIMED

72-Page Book Describes 69 Tubes and 5 Transmitters

The finest and most complete engineering and amateur guide on transmitting tubes ever published by RCA is now off the press. It contains comprehensive data on 69 RCA Air-Cooled Transmitting Tubes including the important new types 815, 816, 8000, 8001, 8003, 8005, and the Midget tubes 9001, 9002, and 9003. Complete data supplemented by carefully proven circuits show how RCA Transmitting Tubes may be used to their best advantage. 8½" x 11" in size, the book contains 72 pages and includes more than 150 circuits and illustrations.

Exceptional Rigs Described

Outstanding feature of the new RCA Guide is the transmitters—designed, constructed, and tested specifically for description in this book. Among these transmitters is included complete constructional information on a plate-modulated RCA-815 transmitter operating from 2½ to 20 meters, a high-power, single-control 813 transmitter, an economy transmitter using an 809, and others. All of the equipment described in the book represents a wide range of application and meets modern demands for ready trans-

POWER TUBE BOOK DELUXE

RCA GUIDE for TRANSMITTING TUBES



The RCA GUIDE for Transmitting Tubes contains a fabulous treasure of information on radio transmitting tubes and transmitters. It is packed with subjects of high interest to all engaged in the art of radio communication. It is fast reading. The RCA GUIDE is bound in a striking cover and is beautifully illustrated throughout. It is the authority on transmitting tubes you cannot afford to be without. Price, 25 cents.

mitter simplicity coupled with efficiency, economy and flexibility. They are designed to give reliable and outstanding performance.

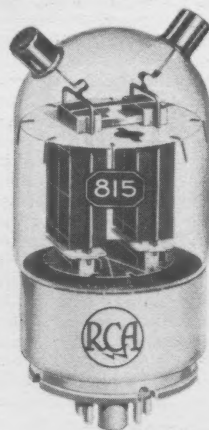
You can obtain a copy of the RCA Guide from your nearest Transmitting Tube Distributor or by sending 25 cents direct to the Commercial Engineering Section, RCA Manufacturing Company, Harrison, New Jersey.

P-P BEAM TUBE, JUNIOR RECTIFIER, UHF MIDGETS, AMONG MANY ANNOUNCED

815 Dual Beam Type Takes 75 Watts Input with Only 0.2 Watt Grid Drive Up to 150 Mc

Time is rare in tube history when the announcement of such tremendously important types as the RCA-815, 816, 931, 8001, 8003, 8005, 9001, 9002, 9003 and 12A6 in a single sweep has been paralleled. Each of these new tubes is designed to meet a long standing demand for a low-cost type that will do a real job in the field for which it was intended—the inexpensive 815 for push-pull r-f work down to 2 meters, the one-dollar 816 rectifier to handle the medium-power supply requirements, the 931 multiplier phototube with sensitivity enough to detect the light of stars, the low-cost Midgets that bring uhf experimentation within the reach of all. Little wonder is there then in our belief that this announcement is of import to all those engaged in radio communication.

P-P BEAM POWER TO 2 METERS



RCA-815 takes 75 watts at the handy plate voltage of 500 volts. It covers the amateur bands from 160 to 2½ meters and requires but one socket, one cathode resistor and one screen resistor.

$C_1, C_2, C_3, C_4 = 0.001 \mu\text{f}$ mica.
 $C_2, C_3, C_4 = 1'' \times 2''$ copper plates insulated from chassis by mica sheet 0.015" thick.
 $L_1 =$ Two copper pipes 8" long and ¾" dia., spaced 1½", center-to-center.
 $L_2 =$ Same as L_1 but 12" long.
 $L_3 =$ 8 turns No. 12 wire wound around R_2 ; diameter of L_3 is twice dia. of R_2 .
 $R_1 = 5000$ ohms, 50 watts.
 $R_2, R_3 = 200$ ohms, 2 watts (non-inductive).
 $S_1, S_2 =$ Sliding shorting bars.
 $T_1 =$ Filament Transformer (7.5 v. 8 a. secondary).

NOTE (1): Connect the two grid terminals and the two plate terminals of each tube in parallel to reduce the respective lead inductances.

NOTE (2): Metal circuit components carrying u-h-f currents should be silver-plated to obtain maximum efficiency.

RCA-815, the new, low-cost, push-pull beam transmitting tube, meets the growing demand by engineers and amateurs for an economical type that will deliver real power on the ultra highs, that requires very little grid drive, that generally needs no neutralization, and gets along on plate voltages of only 400 to 500 volts. The exceptional efficiency of the 815 is made possible by the balanced and compact structure of the beam units, excellent internal shielding, and close electrode spacing. A single 815 operating in push-pull c-w service is capable of handling 75

(Continued on page 2, column 1)

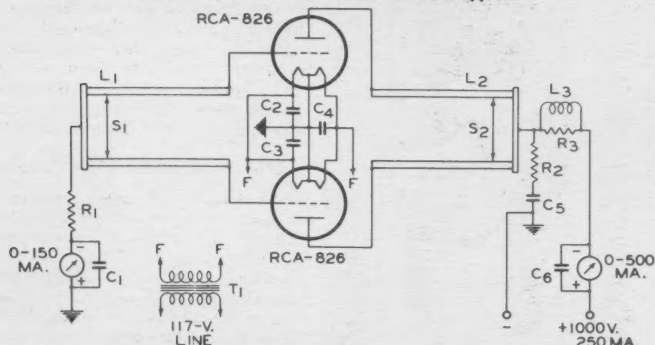
JUNIOR OF THE 866-A/866



Two half-wave, mercury-vapor rectifier RCA-816's will deliver 400 watts of d-c power at a total rectifier tube cost of only \$2.00.

PUSH-PULL RCA-826 OSCILLATOR, 150-200 Mc

Power Output Class C-c-w Service 100 watts approx.



RCA-826 is a ruggedly built triode for use as an oscillator r-f power amplifier and frequency multiplier at the ultra-high frequencies. It has a maximum plate dissipation rating of 60 watts and may be operated with high plate-circuit efficiency at frequencies up to 250 Mc—at reduced ratings up to 300 Mc. The 826 contains a tantalum anode and a double helical thoriated-tungsten filament that is center tapped within the tube to minimize effects of filament inductance.

HAM TIPS from RCA

New Low-Cost Tubes Fill Vital Needs in Communication

(Continued from page 1, column 4)

watts input (ICAS) with less than 0.2 watt of driving power—at frequencies as high as 150 Mc. It may be operated at reduced ratings up to 225 Mc (1¼ meters). The tube is equipped with a big octal-type metal-shell base using low-loss "Micanol" insulation. Its heater may be operated either in parallel from a 6.3-volt supply or in series from a 12.6-volt supply. List price of the 815 is only \$4.50.

Jr. Rectifier Has High Ratings

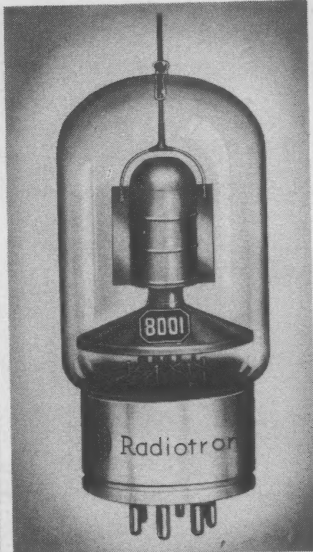
Outstanding among the new tubes is the RCA-816 half-wave, mercury-vapor rectifier—junior of the well-known 866-A/866. The 816 meets the past, present, and future demands for a low-cost rectifier that will handle transmitter requirements too heavy for regular receiving tube rectifiers and yet that are not large enough to require the use of 866-A/866 type. Advantages of the 816 over similar types are (1) its higher peak inverse voltage rating of 5,000 volts made possible by bringing out the plate lead to a separate seal at the top of the bulb, (2) its small receiving tube size, and (3) its long life resulting from use of the famous 866-A/866 type of filament construction. Two 816's operating in a full-wave rectifier circuit are capable of delivering to the input of a choke-input type filter a rectified voltage of 1600 volts at 250 ma., with good regulation, with exceptional life, and at a

GAIN—230,000 TIMES



RCA-931 is a 9-stage multiplier phototube of extraordinary sensitivity. It is capable of detecting infinitesimal quantities of light.

HIGH BEAM POWER TO 75 Mc



RCA-8001 takes a maximum plate input of 300 watts as high as 75 Mc with only 1.4 watts of drive—and without need for neutralization.

total rectifier tube cost of only \$2.00! List price of the 816 is \$1.00.

Phototube Is Supersensitive

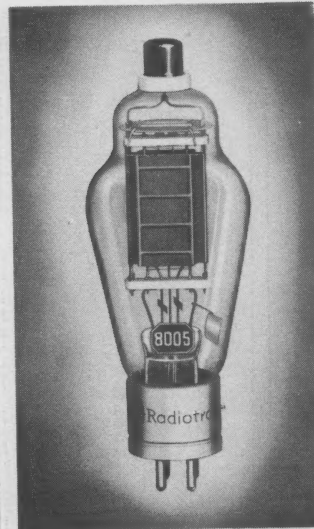
RCA-931 is a radically new multiplier phototube of the high-vacuum type having enormous sensitivity, low noise level, low dark current, and freedom from distortion. It can be coupled to any practical load impedance. It is capable of multiplying feeble currents produced by weak illumination as much as 230,000 times! It has practical application in light-operated relays, in sound reproduction from films, in facsimile transmission, and in scientific research involving low light levels. In short, it is one of the most outstanding phototube developments in recent years. The 931 employs an S-4 photosurface which has unusually high sensitivity to blue-rich light such as that produced by mercury-vapor lamps. Sensitivity to incandescent light at a temperature of approximately 2600° K is comparable with that obtained with an S-1 photosurface but it increases rapidly with increasing temperatures. The 931 contains 9 dynodes (secondary emitters). Electrons emitted from the illuminated photo cathode are directed by fixed electrostatic fields

along curved paths to the first dynode. The electrons strike the dynode surface and produce many other electrons at the moment of impact. The dislodged electrons are known as secondary electrons. The number of secondary electrons dislodged are dependent on the energy of the impinging electrons. These electrons are then directed to a second dynode and in turn knock out more secondary electrons. This multiplying process is repeated in each successive stage with an ever-increasing stream of electrons, until those emitted from the ninth dynode are collected by the anode and constitute the current utilized in the output circuit. List price of the 931 is \$12.00.

Beam Power Plus at 75 Mc

RCA-8001 is a multi-electrode transmitting tube with a maximum plate dissipation rating of 75 watts. The 8001 contains a suppressor and has beam power features. RCA-8001 fills the need by engineers, experimenters, and amateurs for a beam tube that will deliver reasonably high power at the higher radio frequencies. For example, one 8001 will take a maximum plate input of 300 watts at frequencies as high as 75 Mc, with only 1.4 watts of driving power—and without neutralization. The tube is particularly well suited as an r-f amplifier, frequency multiplier, and suppressor, grid-, or plate-modulated amplifier. It may also be used as a class A a-f power amplifier or

SUPER TRIODE



RCA-8005 fills the gap between the 812 and 810 types. Only 6½" high and 2½" in diameter, it is capable of handling maximum input of 300 watts (ICAS) up to 60 megacycles!

modulator and in this service it is capable of delivering approximately 34 watts of audio power with very low distortion. Other features of the 8001 are its dish-type stem which makes possible the use of unusually short internal leads, its hard-glass bulb to withstand extremely high temperatures, its enclosed tantalum anode to insure permanent gas-free operation and to eliminate loss of power from electron bombardment of the bulb, a giant 7-pin base having ceramic insulation and wide pin spacing, and a 37.5-watt thoriated-tungsten filament. List price of the 8001 is \$27.50.

RCA-8003 is a new transmitting triode with a maximum plate-dissipation rating of 100 watts and a low mu of 12. RCA-8003 is suitable for use as an r-f power amplifier, class B modulator, and oscillator. In class C telegraph service, it will deliver a power output of 250 watts. In self-rectifying oscillator circuits such as are used in therapeutic applications, two 8003's are capable of delivering a useful power output of 375 watts when the circuit efficiency is 75%. The tube may be operated at maximum ratings at frequencies as high as 30 Mc—at reduced ratings to 50 Mc. RCA-8003 is designed with the heavy-duty 32.5-watt thoriated-tungsten filament. For a thoroughly dependable triode either in standard transmitter installations or in the special application field, the 8003 is a logical choice. It is as rugged as they come. List price of the 8003 is \$12.00.

8005 is Biggest Little Triode

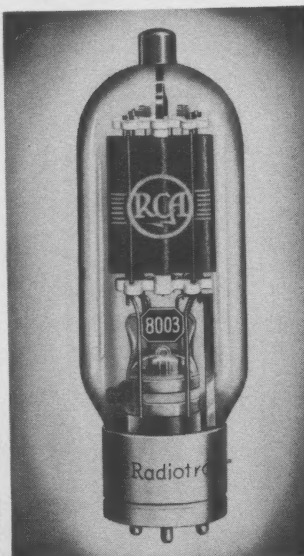
RCA-8005 is the new small-size, high-power transmitting triode deluxe. It will handle 300 watts input in a tube only 6½" high and 2½" in diameter. It has a maximum plate dissipation of 85 watts and a low mu of 20. The 8005 is designed for use as a radio-frequency amplifier and class B modulator. A single tube in c-w service will handle 300 watts input (ICAS) and deliver about 220 watts of power—with less than 8

(Continued on page 3, column 1)

DID YOU KNOW THAT - - -

For the third consecutive time, top winners of the ARRL Sweepstakes used RCA Transmitting Tubes! This year, honors go to W3BES, highest national scorer; W9FS, second highest national scorer; and W6ITH, top-flight 'phone contestant. W3BES used two 812's in the final with an 807 driver. W9FS used an 813 final with an 807 driver. W6ITH used a pair of 806's in the final driven by an 814 buffer and an 807 driver.

KING OF THE 100 WATTERS



RCA-8003 delivers 250 watts at the low plate voltage of 1350 volts—up to 30 Mc. It is designed particularly to withstand high peak voltages.

RCA-8005 CHARACTERISTICS and TENTATIVE RATINGS

FILAMENT VOLTAGE (A.C. or D.C.)	10.0	Volts
FILAMENT CURRENT	3.25	Amperes
AMPLIFICATION FACTOR	20	
DIRECT INTERELECTRODE CAPACITANCES (Approx.):		
Grid-Plate	5.0	µf
Grid-Filament	0.4	µf
Plate-Filament	1.0	µf

As R-F Power Amplifier and Oscillator—Class C Telegraphy

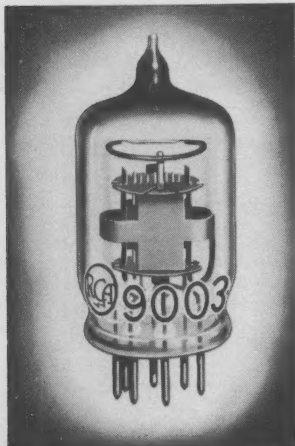
	CCS	ICAS	
D-C PLATE VOLTAGE	1250 max.	1500 max.	Volts
D-C GRID VOLTAGE	-200 max.	-200 max.	Volts
D-C PLATE CURRENT	200 max.	200 max.	Ma.
D-C GRID CURRENT	45 max.	45 max.	Ma.
PLATE INPUT	240 max.	300 max.	Watts
PLATE DISSIPATION	75 max.	85 max.	Watts
TYPICAL OPERATION:			
D-C Plate Voltage	1250	1500	Volts
D-C Grid Voltage:			
From a fixed supply of	-115	-130	Volts
From a grid resistor of	3800	4000	Ohms
From a cathode resistor of	520	560	Ohms
Peak R-F Grid Voltage	240	255	Volts
D-C Plate Current	190	200	Ma.
D-C Grid Current (Approx.)	30	32	Ma.
Driving Power (Approx.)	6.5	7.5	Watts
Power Output (Approx.)	170	220	Watts

New Low-Cost Tubes Fill Vital Needs in Communications

(Continued from page 2, column 4)

watts of grid drive. In plate-modulated service, it will take 240 watts (ICAS) with only 9 watts of grid drive. In self-rectifying oscillator circuits such as are used in therapeutic applications, two 8005's are capable of delivering an output of 250 watts when the circuit efficiency is 75%. Exceptional among its design features are (1) its hard-glass bulb that is capable of withstanding high temperatures without cracking or collapsing, (2) its Zirconium-coated anode having high heat-dissipating qualities and effective getter action, (3) its ceramic plate cap insulator to minimize corona discharge, (4) a metal shell base with ceramic insulation to withstand high temperatures and provide adequate grid circuit insulation, and (5) its heavy-duty, 32.5-w. thoriated-tungsten filament. It may be operated with maximum ratings at frequencies up to 60 Mc. RCA-8005 is designed and built for RELIABILITY. It will deliver the goods under the most severe conditions of operation—in all classes of service, and it will handle more power than any other tube of its size and class. List price of the 8005 is \$7.00.

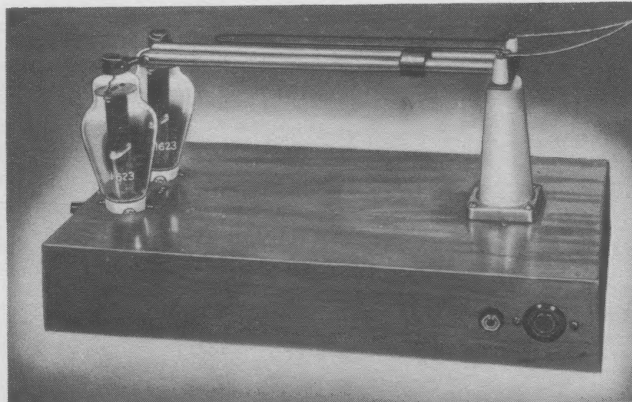
UHF MIDGET



RCA-9001, 9002, and 9003 offer wide possibilities in the economic exploration of the ultra-high-frequencies.

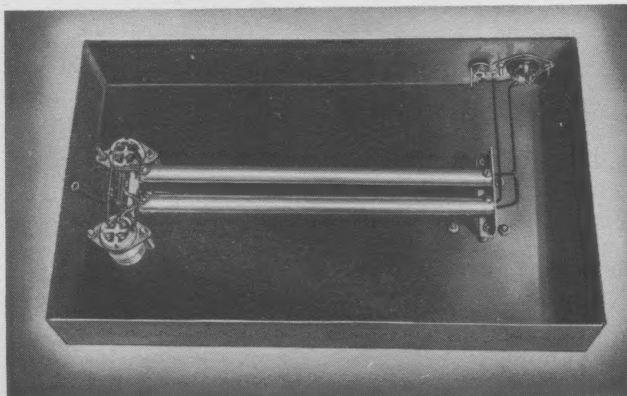
RCA-9001, 9002 and 9003 are the new UHF Midget tubes. They are the answer to the need for low-cost tubes designed particularly for applications requiring high-efficiency, high-gain circuits at unusually high frequencies. For example, the triode 9005 may be used as an oscillator in super-heterodyne receivers up to 500 Mc. Electrically, the 9001, 9002 and 9003 correspond to the Acorn types 954, 955 and 956 respectively. Mechanically, the new Midgets utilize the bulb and base structure of the Miniature types. Their convenient button type 7-pin base permits mounting of the tube in a minimum of space. Double cathode leads in each type reduces input loading and provides increased gain. The 9002 has a double plate lead. The new

PUSH-PULL 1623 OSCILLATOR FOR 2½ METERS



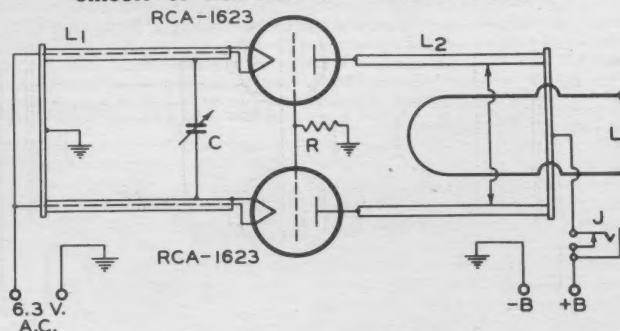
This simple oscillator is capable of delivering 45 watts at frequencies up to 112 megacycles. Features of the unit are its stability of operation and its ease of tuning.

BOTTOM VIEW OF 1623 OSCILLATOR



RCA-1623's were chosen for the job because they are low-mu types and well-suited for oscillator applications. They are unaffected by ordinary plate-load variations and grid-excitation changes.

CIRCUIT OF RCA-1623 2½ METER OSCILLATOR



C = 15 μ f Midget (Cardwell ZR-15-AS).
R = 1000 ohms, 5 watts.
L1 = Two 12" Lengths of 1/4" dia. Copper
Tubing Spaced 1" Between Centers.

L2 = Two 12" Lengths of 1/4" dia. Copper
Tubing Spaced 1 1/2" Between Centers.
Shorting Bar 8 1/2" from Plate End.
L3 = Pick-up Loop, 8" Long.
J = Plate Current Jack.

Midget tubes provide the engineer, experimenter and amateur with tubes at reasonable cost that will work well into the ultra-high frequencies. The 9001, 9002 and 9003 list prices are \$2.50, \$2.00 and \$2.50, respectively. The 12A6 is a beam power amplifier of the metal type with a 12.6-volt, 0.15-ampere heater, well-suited for use in a-c-d-c receivers. With 250 volts on plate and screen, the 12A6 can handle a power output of 2.5 watts with 10% distortion. List price of this tube is \$1.50.

Comprehensive technical information on the foregoing tubes may be obtained by writing direct to the



Commercial Engineering Section, RCA Manufacturing Company, Harrison, New Jersey.

SIMPLE OSCILLATOR DELIVERS 45 WATTS ON 2½ METERS

P-P 1623's Uses Tuned-Plate Tuned-Filament Circuit

Four feet of copper tubing from the local supply house, a few standoffs and a resistor from the junk box, a pair of economical RCA-1623's, and you're all set to take an active part in the increasing 2½-meter activity.

The simplicity of the circuit of the push-pull 1623 rig can be seen by reference to the circuit shown on this page. A glance at the photographs will demonstrate the straight-forward construction employed. The 1623 is a low-mu version of the RCA-809. It is used in this job because it is less critical to changes in grid-excitation voltage and plate-circuit loading than the 809. The tuned-plate, tuned-filament circuit provides stable u-h-f operation and also permits relatively easy tuning adjustments. The efficient resonant lines take up very little space; each line is only a foot long!

The 1623's should be operated at reduced ratings for 2½ meters. For ICAS telegraph conditions, a measured power output of approximately 45 watts can be obtained with only 200 ma. at 500 volts on the plates. For ICAS phone service, the power output is about 30 watts with 200 ma. at 375 volts. Here's a chance for some of you dyed-in-the-wool low-frequency men to operate in the wide-open spaces on 2½, and enjoy a few pleasant rag-chews—and perhaps even a little skip DX.

Let's go, gang!

YOUR BOTTLE AT A GLANCE



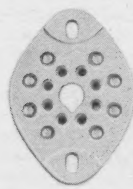
This 8 1/2" x 11" booklet, known as the TT-100, lists the pertinent data on all RCA Transmitting and Special-Purpose Tubes, including the Acorn types, gas types, voltage regulators, phototubes, cathode-ray tubes, and television tubes. Charts on phototubes and transmitting tubes are provided to facilitate selection of a tube type for a particular service or application. The TT-100 is printed in attractive form and is well illustrated with a multitude of tube photographs. Ask your Transmitting Tube Distributor for your copy, or write direct to the Commercial Engineering Section, RCA Manufacturing Company, Harrison, New Jersey.

HAM TIPS from RCA

LOW-LOSS RCA WAFER AND ACORN SOCKETS NOW AVAILABLE

Designed for Xmtg, Midget, and Acorn Tubes

Introduction of many new high-quality, low-loss sockets for RCA transmitting and receiving tubes, including the Acorn and UHF Midgets, has just been announced by the RCA Parts Section. This new line of rugged, dependable tube mountings consists of six Ceramic Wafer Sockets, a special Midget Wafer Socket, and a special Acorn Socket.

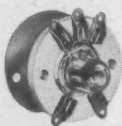


RCA Wafer Socket

The Ceramic Wafers are designed for transmitting, special purpose, and receiving tubes. They have high dielectric properties and low moisture-absorbing characteristics. The top and edge surfaces are glazed and the bottom surface is wax impregnated. Socket contacts are cadmium-plated phosphor bronze having cadmium-plated steel pressure springs. All contacts are recess-mounted to prevent turning. All types other than the octal socket (illustrated) include a circular groove in the top face of the base to facilitate pin location.

The new Midget Wafer Socket, No. 9914, is designed specifically for the new UHF Midget tubes RCA-9001, 9002, and 9003. This socket utilizes a special mica-filled insulation which has low-loss at the ultra-high frequencies. Pin contacts have exceptionally low inter-contact capacity. Net price of this socket is \$.09.

The Acorn socket, Stock No. 9925, is designed specifically for the RCA-954, 955, 956, 957, 958, and 959. This socket utilizes Steatite insulation having extremely low dielectric losses. Top and edges of the socket are glazed to prevent moisture absorption. Grooved silver-plated, beryllium-copper connectors lock the tube in place and provide positive cleaning contacts. A shield plate is included with each socket for use with the pentode type tubes. Amateur net price of this socket is \$.66.



Acorn Socket and Shield

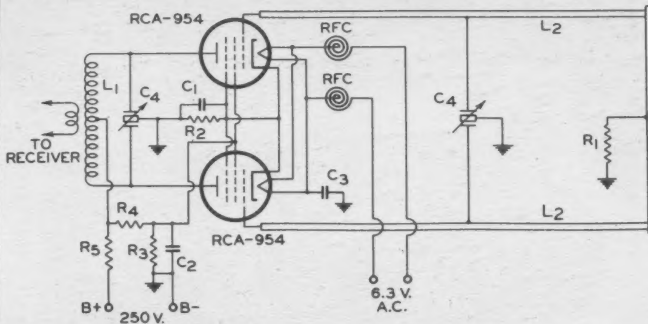
No.	Type	Amateur Net Price
STK-9919	4-contact.....	\$.36
STK-9920	5-contact.....	.36
STK-9921	6-contact.....	.36
STK-9922	7-contact (small pin circle).....	.38
STK-9923	7-contact (medium pin circle).....	.38
STK-9924	Octal (Illustrated).....	.43

These new units will shortly be available for delivery through your RCA Tube and Equipment Distributor.

The license extended to the purchaser of tubes appears in the License Notice accompanying them. Information contained herein is furnished without assuming any obligation.

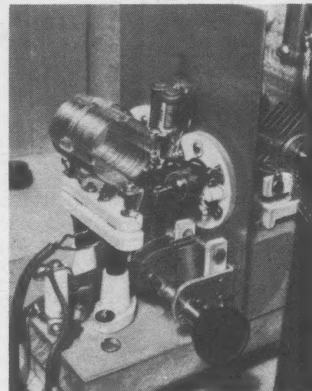
Form 1G3611

W9NNO PRESELECTOR USES 954 TYPE ACORN TUBES IN PUSH-PULL



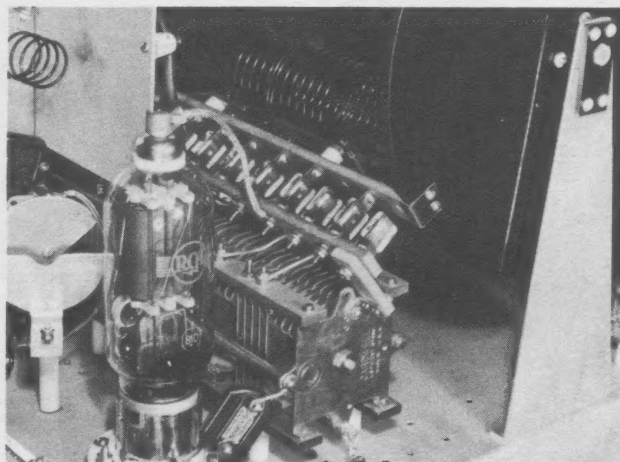
C₁ = .005 μ f.
C₂ = .005 μ f.
C₃ = .005 μ f.
C₄ = See photograph for proportions.
R₁ = 100,000 ohms.
R₂ = 500 ohms.

R₃ = 50,000 ohms.
R₄ = 50,000 ohms.
R₅ = 10,000 ohms.
RFC = 10-meter chokes.
L₁ = Standard low-loss plug-in coil.
L₂ = 15 feet. Tubing spaced 3 inches between centers.



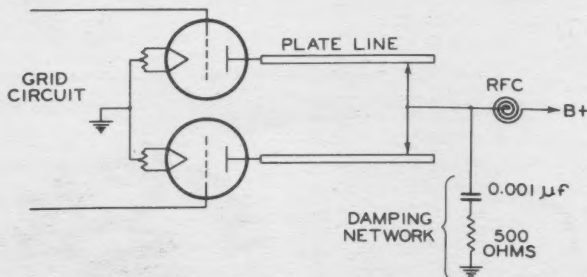
An unusual preselector arrangement has been submitted by Mr. Forrest Nelson, W9NNO, St. Louis Park, Minnesota. The unusual point of interest in the layout is the 954 grid line, which is tuned for 20- and 10-meter operation. This line consists of two 15-foot lengths of 1/2" diameter copper tubing, spaced approximately 3" apart. The line is run from the preselector to the ceiling of the shack, then across the ceiling to the opposite wall. To use the same line for 10-meter reception, it is merely necessary to connect a shorting bar across the line at approximately 7 1/2 feet from the amplifier. The grid tuning condenser, C₄, is motor-driven. The motor is controlled at the operating table by a 135-ohm potentiometer connected in a balanced relay bridge circuit.

BAND-SWITCHING 810 FINAL, NE-PLUS



A check for \$5.00 is on the way to W6QPD of Glendale, California, for this photo of his business-like 810 final amplifier. The picture shows the coil turret which not only selects the proper inductor for the band in use, but also cuts in the proper tank capacitance. The transmitter is a band-switch affair from stem to stern. Tube complement includes an 807 as crystal or E.C. oscillator, 807 buffer, 810 final, and class B modulator 808's. Every tube in the outfit is RCA. Nice work, W6QPD!

EFFECTIVE NETWORK ELIMINATES PARASITICS IN P-P UHF OSCILLATOR



Very often a troublesome form of parasitic oscillation occurs in push-pull, ultra-high-frequency oscillators or amplifiers. This parasitic is caused by tubes oscillating in parallel at a frequency usually lower than the frequency desired. The oscillation, superimposed upon the normal mode of operation, generally manifests itself by producing instability in the output and by overloading one or the other tubes. A simple and effective method of stabilizing such a circuit is to connect a damping network consisting of a 0.001 μ f condenser in series with a 500-ohm, non-inductive resistor from the center-tap of the plate tank (or plate line) to ground. For circuits having inputs up to 150 watts, a 2- or 3-watt carbon resistor should be adequate.

DIRECTIONS

Before operating the checker, see that all gadgets are in normal position—all indicators should be set at 6% except levers A, C, D and E which will be at full, on, danger, and up respectively.

To operate—

1. Place Watzit in such a position that the intersection of cross-hairs in sight is superimposed upon one thing or another.
2. Push lever "A" to left until it points to empty.
3. Push down on button "B" until snapping of catch is heard...
4. Slide doodad "C" to your left.
5. Pull lever "D" up toward down and Watzit is ready for another operation.

Knob "D" is for operating erasing mechanism. However, since there is no such thing, this knob will be referred to as dummy. To change length of down stroke, move screw "H" in any direction. To change angle of up-stroke, loosen a screw and slide pivot "F" to or fro. If pencil point melts, remove by loosening screw "B"... since this is a class 5/4 ft... and cockeyed at that.

Important—Never operate button "B" with "A" in "Full" position or Watzit will draw a red line in midair!

Printed in U.S.A.